

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 12969 (1990): Internal Combustion Engines - Methods of Test for Quality Characteristics of Valves [TED 2: Automotive Primemovers]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक

(Reaffirmed 2000)

अन्तर्दाही इन्जन—वाल्व के गुणता लक्षणों के
आंकलन की पद्धति

Indian Standard

INTERNAL COMBUSTION ENGINES—
METHODS OF TEST FOR QUALITY
CHARACTERISTICS OF VALVES

UDC 621'43-462'1 : 620'1

© BIS 1990

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 20 April 1990, after the draft finalized by the Automotive Primemovers Sectional Committee had been approved by the Transport Engineering Division Council.

This Indian Standard forms an important adjunct to IS 810 : 1990 'Internal combustion engines — valves—Specification (*second revision*)', and is to be referred for terminologies and figurative representations.

Indian Standard

INTERNAL COMBUSTION ENGINES — METHODS OF TEST FOR QUALITY CHARACTERISTICS OF VALVES

1 SCOPE

1.1 This Indian standard specifies the general methods of inspection for assessing the quality characteristics of engine valves conforming to IS 810 : 1990.

2 REFERENCES

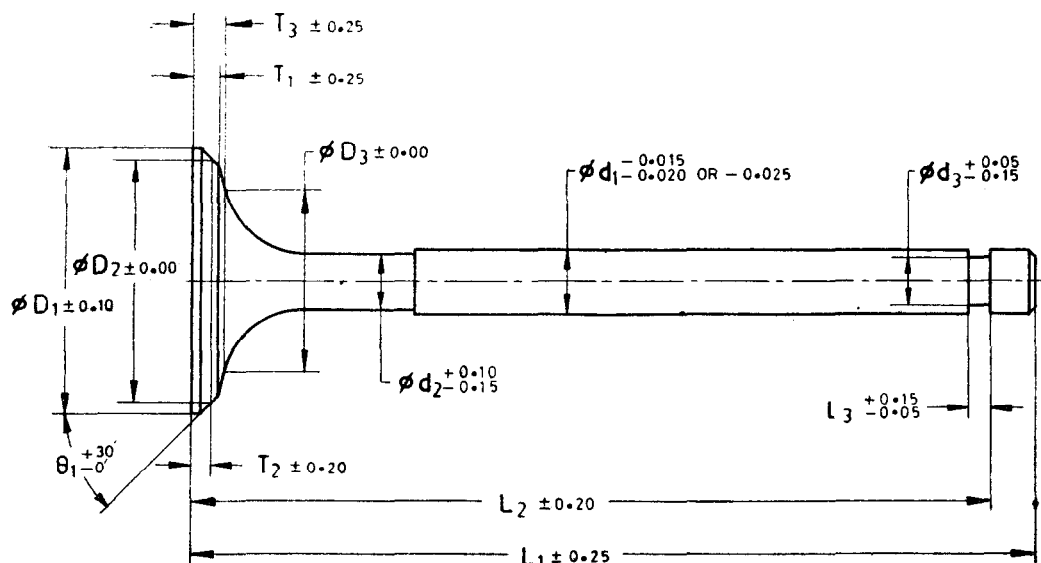
IS No.	Title
810 : 1990	Internal combustion engines — valves — specification (<i>second revision</i>)
1501 (Part 2) : 1984	Method for vickers hardness test for metallic materials : Part 2 HV 0.2 to less than HV 5 (<i>second revision</i>)
3203 : 1982	Methods of testing local thickness of electroplated coatings (<i>first revision</i>)
3658 : 1981	Code of practice for liquid penetrant flaw detection (<i>first revision</i>)

3 TERMINOLOGY

3.1 The terminology shall be in accordance with IS 810 : 1990.

4 DIMENSIONAL TOLERANCES

4.1 The dimensional tolerances on different characteristics of valves shall be as shown in Fig. 1.



All dimensions in millimetres.

FIG. 1 DIMENSIONAL TOLERANCES

4.1 Valve Face Angle

The face angle shall be measured generally using a profile projector or a tool maker's microscope having a suitable attachment. The angle measurement normally is carried out at a magnification between 10X and 30X.

4.2 Face Runout

Valve stem shall be supported near both ends on two 90° 'V' plates with a stopper placed at the near centre of the tappet face, and a dial indicator set at right angles to the near centre of the valve face width. The valve is then turned and the pointer deflection measured as the total indicated reading.

4.3 Stem Circularity

Valve shall be supported horizontally on a 90° V block, a stopper placed at the near centre of the tappet face and a dial indicator set at right angles vertically above the V block. The valve is then turned and the total indicated reading taken as the circularity.

4.4 Stem Straightness

Valve stem shall be supported near both ends on two 90° V plates, dial indicator set at right angles to the valve stem at about midway between the two supports and one half of the pointer deflection is measured while turning the valve.

4.5 Cylindricity

Valve stem diameter shall be measured at about three places around the circumference and the difference between the maximum and minimum readings shall be taken.

4.6 Groove Runout

Valve stem shall be supported near both ends on two 90° V plates and a dial indicator set at right angles to the system corresponding to the near centre of the groove. The valve shall be turned around and the total indicated reading shall be expressed as the groove runout.

4.7 Tappet Face Runout

The valve stem shall be supported horizontally on a 90° 'V' block with a stopper. A dial indicator shall be placed near the outer perimeter of the tappet face in the axial direction of the valve, one at each end. The valve is turned around for measurement. The total indicated reading is the tappet face runout.

4.8 Crown Face Runout

The crown face runout shall be checked in the manner outlined for face runout (*see* 4.2).

4.9 Face Height

The face height shall be measured from the bottom of the valve face when the neck profile includes a flat next to the valve face. This is so since the reference point for measurement is well defined and such flats are invariably provided in valve neck profiles left unmachined (known as 'Die finished radius'). For valves without such flat surface below the valve face a reference diameter shall be provided in the valve drawing and the height shall be measured from this fixed reference point. This shall be termed as 'Head Thickness' or 'Reference Thickness'.

5 SURFACE TREATMENT CHARACTERISTICS

5.1 Chromium plated valves shall be assessed in accordance with IS 3203 : 1982. The thickness of plating, hardness, surface finish of hard chrome plated valves shall comply with the following:

Plating Thickness (μm)	Hardness HV, Min (load in g)	Surface Finish of Stem After Plating $\mu\text{m Ra, Max}$
2 to 10	—	0.6
Above 10 and including 20	700 (50)	0.6
Above 20	700 (100)	0.6

5.2 Soft Nitriding

Soft nitrided valves shall comply with the following:

Thickness of Nitrided Layer μm	Hardness of Nitrided Layer HV, Min (load g)	Surface Finish $\mu\text{m Ra, Max}$
10 Min	500 (200 g)	0.8

The Vickers hardness test shall be carried out in accordance with IS 1501 (Part 2) : 1984.

NOTE — The following shall be taken care of before checking:

- The nitrided surface shall be free of salt or other scales
- The hardness shall be checked on a polished or buffed surface to ensure proper reflectivity for Vickers hardness checking
- The layer thickness shall be the total case depth as measured on a metallographic cut section etched with 10 percent Nital of Marble's solution.

6 TENSILE STRENGTH OF METALLIC VALUES

6.1 The minimum tensile strength of bimetallic valve shall be 70 N/mm². The failure in tensile test shall take place either at the weld corresponding to a minimum of 70 N/mm² or outside the weld corresponding to the tensile values of the individual materials. Alternatively, a notched tensile test can be performed to ensure the failure at the weld subject to agreement between the purchaser and the supplier.

6.2 Bend Test

The static bend testing of the vice-type and rotary bend testing as well as the degree of bend to be specified shall be as agreed to between the purchaser and the supplier.

7 BUTTON WELDS (BOND TEST)

7.1 When tested on the longitudinal section through the tappet end, the weld shall reveal at least 80 percent bonding.

7.2 Other tests such as shear for assessment of weld strength, or radiographic examination shall be as agreed to between the purchaser and the supplier.

8 CRACK DETECTION TEST FOR VALVE TAPPET FACE

8.1 The hard facing at the valve or tappet face when tested in accordance with IS 3658 : 1981 shall be free of cracks. The seating area of valve face, tappet face and chamfer shall be free of any porosity. However, porosity indications outside, these areas are permissible.

9 MACRO ETCHING

9.1 High alloy martensitic and austenitic steels and the nickel based alloys require special specimen preparation and etching techniques to develop the flow lines. That the flow lines are continuous and follow the throat contour can also be ensured at the time of manufacture by using separate bottom die for each valve pattern and ensuring in a profile projector that the forging profile is an oversize of the finished valve profile. The general practice to be followed during macro etching is outlined in 9.2.

9.2 Etching for flow lines would require extremely careful surface preparation with a minimum of cold work. Polishing the specimen surface with series of metallographic papers will give satisfactory results. The papers should present a fresh surface each time to ensure freedom from cold work and to effect proper grinding of the surface. Low alloy valve steels may be etched by immersion in a bath of 1:1 Hydrochloric acid for a period of 5 to

30 minutes. The solution may be heated to about 75°C. The etchants recommended for high alloy valve steels are aqua regia, hydrochloric acid, hydrogen peroxide and Marble's reagent. Each of the above requires careful specimen preparation. Desmutting the surface after etching may be done by scrubbing or by ultrasonic cleaning. Contrast after etching may also be increased by wiping the surface lightly with very fine metallographic paper, or by light polishing.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference :

Doc : No. TED (5156)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

Telephone

{ 331 01 31
331 13 75

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola
CALCUTTA 700054

37 86 62

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036

2 18 43

Southern : C.I.T. Campus, IV Cross Road, MADRAS 600113

41 29 16

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
BOMBAY 40009

6 32 92 95

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR.

COIMBATORE, FARIDABAD, GHAZIABAD, GUWAHATI.

HYDERABAD. JAIPUR. KANPUR. PATNA. THIRUVANAN THAPURAM